1313, it is determined whether the frame for which coding is complete is the last frame, and if it is the last frame, coding is terminated in step 1315. When it is not the last frame,1 is added to N in a step 1314, the routine returns to the step 1303 again, and encoding of the next frame is started. It will be understood that although the flowchart described here relates to a method of applying block matching to the global motion compensation predicted image synthesized as a result of performing global motion compensation (method corresponding to a device using a motion compensation processor 801 of Fig. 8), a flowchart relating to a method of performing global motion compensation and global matching in parallel (method corresponding to a device using a motion compensation processor 901 of Fig. 9) can be prepared by making a slight modification.--

IN THE CLAIMS

Please cancel claims 29-52 without prejudice or disclaimer.

Please amend claims 1-28 as indicated below:

1. (Amended) A method of synthesizing an interframe predicted image comprising:

a first step for calculating the values of motion vectors of four representative points at coordinates (i,j), (i+p, j), (i, j+q), (i+p, j+q) (where i, j, p, q are integers, the horizontal and vertical components of the motion vectors of the representative points

taking the values of integral multiples of 1/k where k is the hk power of 2, and hk is a non-negative integer),

a second step for calculating the motion vectors of a pixel at coordinates (x+w, y+w) by performing bilinear interpolation/extrapolation on the motion vectors of the four representative points of an image where the pixel sampling interval in both horizontal and vertical directions is 1 and horizontal and vertical coordinates of sampling points are obtained by adding w to integers (where w=wn/wd, wn is a non-negative integer, wd is a hw power of 2, hw is a non-negative integer and wn<wd), where the aforesaid second step comprised of:

A6 cont

a third step for calculating the horizontal and vertical components of motion vectors at the coordinates (i, y+w) as numerical values which are respectively integral multiples of 1/z (where z is the hz power of 2, and hz is a non-negative integer) by linear interpolation/extrapolation of the motion vectors of the representative points at the coordinates (i, j), (i, j+q), and for calculating the horizontal and vertical components of the motion vectors at the coordinates (i+p, y+w) as values which are respectively integral multiples of 1/z (where z is the hz power of 2, and hz is a non-negative integer) by linear interpolation/extrapolation of the motion vectors of the representative points at coordinates (i+p, j), (i+p, j+q), and

a fourth step for calculating the horizontal and vertical

components of the motion vectors of the pixel at the coordinates (x+w, y+w) as values which are respectively integral multiples of 1/m (where m is the hm power of 2, and hm is a non-negative integer), found by linear interpolation/extrapolation of the two motion vectors at the coordinates (i, y+w), (i+p, y+w).

2. (Amended) A method of synthesizing an interframe predicted image comprising:

a first step for calculating the values of motion vectors of four representative points at coordinates. (i,j), (i+p, j), (i, j+q) (i+p, j+q) (where i, j, p, q are integers, the horizontal and vertical components of the motion vectors of the representative points taking the values of integral multiples of 1/k where k is the hk power of 2, and hk is a non-negative integer),

A6 cont

a second step for calculating the motion vectors of a pixel at coordinates (x+w, y+w) by performing bilinear interpolation/extrapolation on the motion vectors of four representative points of an image where the pixel sampling interval in both horizontal and vertical directions is 1 and horizontal and vertical coordinates of sampling points are obtained by adding w to integers (where w=wn/wd, wn is a non-negative integer, wd is a hw power of 2, hw is a non-negative integer and wn<wd), where the second step comprised of:

a third step for calculating the horizontal and vertical

components of motion vectors at the coordinates (x+w, j) as numerical values which are respectively integral multiples of 1/z (where z is the hz power of 2, and hz is a non-negative integer) by linear interpolation/extrapolation of the motion vectors of the representative points at the coordinates (i, j), (i+p, j), and for calculating the horizontal and vertical components of the motion vectors at the coordinates (x+w, j+q) as values which are respectively integral multiples of liz (where z is the hz power of 2, and hz is a non-negative integer) by linear interpolation/extrapolation of the motion vectors of the representative points at coordinates (i, j+q), i+p, j+q), and

A6 cont

a fourth step for calculating the horizontal and vertical components of the motion vectors of the pixel at the coordinates (x+w, y+w) as values which are respectively integral multiples of 1/m (where m is the hm power of 2, and hm is a non-negative integer), found by linear interpolation/extrapolation of the two motion vectors at the coordinates (x+w, j), (x+w, j+q).

3. (Amended) A method of synthesizing an interframe prediction image according to Claim 1, wherein, when the motion vectors of a pixel at the coordinates (x+w, y+w) are found using (u0, v0), (u1, v1), (u2, v2), (u3, v3), which are the horizontal and vertical components of the motion vectors of the representative points at the coordinates (i,j), (i+p, j), (i, j+q), (i+p, j+q) multiplied by k,

(uL(y+w), vL(y+w)) which are the horizontal and vertical components of the motion vectors at a point having the coordinates (i, y+w) multiplied by z, are found by calculating:

$$uL(y+w) = (((q.wd - (y-i).wd-wn) u0 + (y-i).wd + wn) u2)z)////(q.k.wd),$$
$$vL(y+w)=(((q.wd-(y-i).wd-wn) v0+(y-i).wd+wn) v2) z)////(q.k.wd)$$

(where *[////]* is a division wherein the computation result is rounded to the nearest integer when the result of an ordinary division is not an integer, and the order of computational priority is equivalent to multiplication and division),

A6 cont

(uR(y+w), vR(y+w)) which are the horizontal and vertical components of the motion vector at a point having the coordinates (i+p, y+w) multiplied by z, are found by calculating:

$$uR(y+w)=(((q.wd-(y-i).wd-wn) u1 + ((y-i).wd+wn) u3) z) //// (q.k.wd)$$
$$vR(y+w)=(((p.wd-(y-i).wd-wn) v1 + ((y-i).wd+wn)v3)z)////(q.k.wd), and$$

(u(x+w), y+w), v(x+w, y+w))

which are the horizontal and vertical components of the motion vector of a pixel at the coordinates (x+w, y+w) multiplied by m, are found by calculating:

$$u(x+w, y+w)=(((p.wd-(x-i).wd-wn) uL(y+w)+((x-i).wd+wn) uR(y+w))m)//(p.z.wd)$$

v(x+w, y+w)=(((p.wd-(x-i).wd-
wn) vL (y+w) + ((x-i).wd+wn)vR) (y+w))m)///(p.z.wd)

(where *[//]* is a division wherein the computation result is rounded to the nearest integer when the result of an ordinary division is not an integer, and the order of priority is equivalent to multiplication and division).

4. (Amended) A method of synthesizing an interframe predicted image according to Claim 2, wherein, when the motion vectors of a pixel at the coordinates (x+w, y+w) are found using (u0, v0), (u1, v1), (u2, v2), (u3, v3), which are the horizontal and vertical components of the motion vectors of the representative points at the coordinates (i,j), (i+p, j), (i, j+q), (i+p, j+q) multiplied by k,

(uT(x+w), vT(x+w)) which are the horizontal and vertical components of the motion vectors at a point having the coordinates (x+w, j) multiplied by z, are found by calculating:

uT(x+w)=(((p.wd-(x-i).wd-
wn) u0+((x-i).wd+wn)u1)z)////(p.k.wd),
vT (x+w)=(((p.wd-(x-i).wd-
wn) v0+((x-i).wd+wn)v1)z)////(p.k.wd)

(where [////] is a division wherein the computation result is rounded to the nearest integer when the result of an ordinary division is not an integer, and the order of computational priority is equivalent to multiplication and division),

(uB(y+w), vB(y+w)) which are the horizontal and vertical components of the motion vectors at a point having the coordinates (x+w, j+p) multiplied by z, are found by calculating: uB(x+w)=(((p.wd-(x-i).wd- wn)u2+((x-i).wd +wn)u3)z)////(p.k.wd),vB(x+w)=(((p.wd-(x-i).wd- wn)v2+((x-i).wd+wn)v3)z)////(p.k.wd), and

(u(x+w), y+w), v(x+w, y+w)) which are the horizontal and vertical components of the motion vectors of a pixel at the coordinates (x+w, y+w) multiplied by m, are found by calculating:

A6 cont

u (x+w, y+w)=(((q.wd-(y-i).wd-wn)uT(x+w)+((y-i).wd+wn)uB(x+w))m)//(q.z.wd)

v(x+w, y+w)=(((q.wd-(y-i).wd-wn)vT(x+w)+ ((y-i).wd+wn)vB(x+w))m)//(q.z.wd)

(where *[//]* is a division wherein the computation result is rounded to the nearest integer when the result of an ordinary division is not an integer, and the order of priority is equivalent to multiplication and by division).

5. (Amended) A method of synthesizing an interframe predicted image according to Claim 1, wherein the absolute value of p is the α power of 2 (where α is a non-negative integer).

6. (Amended) A method of synthesizing an interframe predicted image according to Claim 2, wherein the absolute value of q is the β power of 2 (where β is a non-negative integer).

7. (Amended) A method of synthesizing an interframe predicted image according to Claim 1, wherein the absolute values of p and q are respectively the α power of 2 and β power of 2 (where α , β are non-negative integers).

A6 cont

8. (Amended) A method of synthesizing an interframe predicted image according to Claim 2, wherein the absolute values of p and q are respectively the α power of 2 and β power of 2 (where α, β are non-negative integers).

9. (Amended) A method of synthesizing an interframe predicted image according to Claim 5, wherein α+hz is a positive integral multiple of 8, and w is 0.

10. (Amended) A method of synthesizing an interframe predicted image according to Claim 6, wherein β+hz is a positive integral multiple of 8, and w is 0.

11. (Amended) A method of synthesizing an interframe predicted image according to Claim 5, wherein α+hz+hw is a positive integral multiple of 8, and w>0.

12. (Amended) A method of synthesizing an interframe predicted image according to Claim 6, wherein β+hz+hw is a positive integral multiple of 8, and w>0.

13. (Amended) A method of synthesizing an interframe predicted image according to Claim 9, wherein the value of hz is varied according to the value of α so that α+hz is 16 or less for plural different values of α.

A6 cont

14. (Amended) A method of synthesizing an interframe predicted image according to Claim 10, wherein the value of hz is varied according to the value of β so that β+hz is 16 or less for plural different values of β.

15. (Amended) A method of synthesizing an interframe predicted image according to Claim 11, wherein the value of hz is varied according to the value of α so that α+hz+hw is 16 or less for plural different values of α.

16. (Amended) A method of synthesizing an interframe predicted image according to Claim 12, wherein the value of hz is varied according to the value of β so that β+hz+hw is 16 or less for plural different values of β.

17. (Amended) A method of synthesizing an interframe predicted image according to Claim 1, wherein $z \geq m$.

18. (Amended) A method of synthesizing an interframe predicted image according to Claim 1, wherein $k \geq z$.

A6 cont

19. (Amended) A method of synthesizing an interframe predicted image according to Claim 1, wherein the absolute values of p and q are respectively different from the number of horizontal and vertical pixels in the image.

20. (Amended) A method of synthesizing an interframe predicted image according to Claim 1, wherein,when r is the number of pixels in the horizontaldirection and s is the number of pixels in the vertical direction of the image (where r, s are positive integers), 1/2 of the absolute value of p is less than r, the absolute value of p is equal to or greater than r, 1/2 of the absolute value of q is less than s, and the absolute value of q is equal to or greater than s.

21. (Amended) A method of synthesizing an interframe predicted image according to Claim 1, wherein, when r is the number of pixels in the horizontal direction and s is the number of pixels in the vertical direction of the image (where r, s are positive integers), the absolute value of p is equal to or less than r, twice the absolute value of p is larger than r, the absolute value of q is equal to or less than s, and twice the absolute value of q is larger than s.

A6 cont

SUB B2

22. (Amended) A method of synthesizing an interframe predicted images according to Claim 1, wherein,

when the number of pixels in the horizontal and vertical directions of the image is respectively r and s (where r and s are positive integers), and the pixels of the image lie in a range wherein the horizontal coordinate is from 0 to less than r and the vertical coordinate is from 0 to less than s, (u0, v0), (u1, v1), (u2, v2), (u3, v3)which are expressed by

u' (x, y)=(((s.cd-cn-y.cd)((r.cd-cn-x.cd)u00 + (x.cd+cn)u01) + (y.cd+cn) ((r.cd-cn-x.cd)u02+(x.cd+cn)u03))k) ///(r.s.n.cd),

v'(x, y)=(((s.cd-cn-y.cd)((r.cd-cn-x.cd)v00 +(x.cd+cn)v0l)+ (y.cd+cn) ((r.cd-cn-x.cd)v02+(x.cd+cn)v03))k)///(r.s.n.cd),

u0=u' (i, j)
v0=v' (i, j)
u1=u' (i+p, j)
v1=v' (i+p, j)
u2=u' (i, j+q)
v2=v' (i, j+q)
u3=u' (i+p, j+q)
v3=v' (i+p, j+q)

(where is a division wherein the computation result is rounded to the nearest integer when the result of an ordinary division is not an integer, and the order of priority is equivalent to multiplication and division), are used as the k times horizontal and vertical components of motion vectors of representative points (i,j), (i+p, j),

(i, j+q), (i+p, j+q), by using (u00, v00), (u01, v01), (u02, v02), (u03, v03) (where u00, v00, u01, v01, u02, v02, u03, v03 are integers), which are n times (where n is a positive integer) motion vectors at the corners of an image situated at the coordinates (-c, -c), (r-c, -c), (-c, s-c), (r-c, s-c) (where c=cn/cd, cn is a non-negative integer, cd is a positive integer and cn<cd), whereof the horizontal and vertical components take the values of integral multiples of 1/n.

Sub C4

23. (Amended) An image encoding method using a method of synthesizing an interframe predicted image comprising:

a first step for synthesizing an interframe predicted image by performing motion compensation using a decoded image of a previously encoded frame and an input image of current frame,

a second step for generating a differential image between said interframe predicted image and said input image of said current frame,

a third step for transforming said differential image to obtain a transformed signal which is then encoded,

a fourth step for applying an inverse transformation to said transformed signal to produce a decoded differential image and

a fifth step for generating a decoded image of said current frame by adding said decoded differential image and said

interframe predicted image, wherein said fifth step is performed by an interframe predicted image synthesis method according to Claim1.

24. (Amended) An image encoding method using a method of synthesizing an interframe predicted image comprising:

a first step for synthesizing an interframe predicted image by performing motion compensation using a decoded image of a previously encoded frame and an input image of current frame,

a second step for generating a differential image between said interframe predicted image and said input image of said current frame

a third step for transforming said differential image to obtain a transformed signal which is then encoded,

a fourth step for inverse transforming said transformed signal to obtain a decoded differential image, and

a fifth step for synthesizing a decoded image of a current frame by adding said decoded differential image and said interframe predicted image wherein,

said first step is performed by an interframe predicted image method as defined in claim 22, and

said first step comprises a step for detecting and encoding information relating to said motion vectors at the corners of an image.

25. (Amended) An image coding method according to Claim 23, wherein the representative points in said fifth step are the corners of the image.

26. (Amended) An image decoding method comprising:

a first step for inputting an interframe coding signal of an image frame which is to be decoded and motion vector information concerning said image frame,

a second step for transforming said interframe coding signal into a decoded differential signal,

a third step for producing an interframe predicted image from a decoded image signal of another image frame different in time from said image to be decoded and said motion vector information, and

a fourth step for adding the decoded differential signal and said interframe predicted image signal to obtain a decoded image signal of said image frame which is to be decoded, wherein

said third step is performed by an interframe predicted image synthesis method according to Claim 1.

A6 cont

C4 cont'd

C4 cancel.

27. (Amended) An image decoding method according to Claim 26, wherein said plural representative points are the corner points of said image used by reproducing information relating to the motion vectors of the representative points directly encoded as encoded data.

A6 cancel

28. (Amended) An image decoding method according to Claim 26, wherein said plural representative points are the corner points of said image.